[Proc. Roy. Soc. Victoria, 52 (N.S.), Pt. I., 1939.]

Art VIII.—*Studies on the Australian Clavariacea, Part* III.

By STELLA G. M. FAWCETT.

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Genus **Clavaria** (*continued*).

In two previous papers (1 and 2) Groups 1, 2, 3, 4, 7, 8, 9 and 10 of the genus *Clavaria* were dealt with. In this part additions are made to Groups 9 and 10 of the genus and in addition one species of *Physalacria* is described.

Group 10 (continued).

Clavaria flava Fr. ex Schaeff. Fung. Bavar. pl. 175, 1763.

? *C. lutea* Venturi. I miceti del agro Bresciano, p. 36, pl. 41, fig. 4, 1845-1860.

C. flavo-Brunescens Atk. Ann. Myc. 7, 367, 1909.

Plate VI, figs. 1 and 2, text. fig. 1*d*.

Plate VII, fig. 5.

Plants very variable in size, ranging from 4-18 cm. diameter and 5-16 cm. height. Base comparatively stout and obtuse, occasionally tapering, not deeply rooting, smooth, or with a few broad, shallow furrows. Arrangement of the branches variable: a large number of small branches, which soon divide to form the ultimate tips, may arise from the top of the trunk, or there may be a few large primary divisions which branch once or twice to form the ultimate tips. The latter are usually rather delicate and bluntly cusped, forming a close mass, sometimes they are obtuse, few in number and thick.

Axils for the most part rounded, branches spreading, lacking a strongly upright tendency. Surface of branches usually smooth but occasionally finely and evenly rugose. Colour, Maize Yellow, Chrome Yellow, Antimony Yellow, base whitish, not staining when bruised. Flesh creamy or white, paler than the surface, crisp and brittle in youth, becoming softer and more translucent with age. Taste and odour, mild, slightly fungal.

Spores about Maize Yellow in colour, elliptical, with an obliquely terminal mucro, distinctly and evenly roughened, $3.2\text{–}4.3 \times 7\text{–}11\ \mu$. Habitat—on the ground in forests.

This species is very variable in form but its colour is distinct and is generally described as a clear pale yellow without a tint of orange. It approaches *C. ochraceo-salmonicolor* in form and colour but may be distinguished from it by its fine, unexpanded tips. Although, in colour, it resembles *C. sinapicolor,* it may be distinguished from this species by its solid, compact, relatively smooth base, by its spreading habit and short branches and mild indistinct odour.

CLAVARIA FLAVA var. AUREA Coker. Clavarias of the U.S. and Canada, p. 124, pl. 38 and 85. Chapel Hill, 1923.

(Plate VII, fig. 1, text fig. 1. (E).)

Plants branched and bulky, often very large (25 cm. broad), usually about 10 cm. high and 8 cm. broad. Branching irregularly and sub-dichotomously from a short, stout base into very many branches which divide three, four or five times before the ultimate tips are formed. These are bluntly rounded, and short. The whole forms a close mass. Branches cylindrical, generally smooth, but tending to be rugose in age; axils acute. Flesh crisp and brittle in youth, becoming much softer and rather lax at maturity, somewhat translucent. Colour, base whitish for a variable distance, body of plant Apricot Buff to Orange Buff or Ochraceous Buff. Tips, Capucine Yellow or paler, becoming concolorous in age. Flesh coloured like the surface but with a distinctly pinkish tinge which it retains throughout the life of the plant. In age, under moist conditions, the colour of the body of the plant does not change appreciably but in a dry atmosphere the entire plant tends to become Pinkish Cinnamon or Cinnamon Buff. Taste and odour indistinct, mild.

Spores faintly, but evenly roughened, elliptical with a broad, obliquely terminal mucro, 3.5–4.5 (occasionally 4.8) × 7–9.5 μ. Habitat—on ground in forests and heathlands, very abundant on burnt soil.

This plant may be distinguished from the typical *C. flava* by its richer colour and pinkish, rather translucent flesh and from the deeper coloured form of *C. ochraceo-salmonicolor* by its unexpanded, paler tips and by the colour of the flesh. Intermediate forms are very difficult of identification.

CLAVARIA OCHRACEO-SALMONICOLOR Clel. Trans. Roy. Soc. S.A., lv, 1931, pp. 152-160.

(Plate VI, fig. 3, fig. 4, text fig. 1.(F.))

Plants branched, large or medium-sized, 5-15 cm. high and 5-14 cm. broad. Trunk distinct, stout, solid, 2-4 cm. broad; giving rise to numerous primary branches which divide three to five times before the ultimate tips are formed. Axils acute, branches with strongly developed, broad longitudinal furrows which originate in the axils. Ultimate tips rather broadly expanded, consisting of two to five more or less hemispherical knobs. The tips and upper branches form a very close cauliflower-like mass but with the tips distinct and not fused. In fresh specimens the tips do not differ in colour and texture from the body of the plant but in the dried state they show a difference in colour, being near Honey Yellow, while the body of the plant is about Cinnamon Buff or Pinkish Buff. Flesh white or pale, solid, brittle. Taste and odour indistinct. Colour (of living plants) very variable, Naples Yellow, Antimony Yellow, pale Orange Yellow, Capucene Buff, Capucine Orange. Tips generally slightly darker in colour than the rest of the plant.

Spores ochraceous, evenly and finely roughened, oblong elliptical, with an obliquely terminal mucro, 8.1–10.5 × 3.9–5.2 μ. Habitat—on the ground in forested or heathy areas.

The above description is considerably more restricted than that given by Cleland. Although the species has a wide colour range, its form is fairly constant and the spores do not vary a great deal in length. From the range of spore size given by Cleland (7.5–13 × 3.7–5.5 μ) it would appear that he had included *C. flava* and its variety *aurea* and possibly *C. capitata*, all of which show colours similar to those of *C. ochraceo-salmonicolor.*

The species may be distinguished from *C. flava* and *C. flava* var. *aurea* by its expanded tips, and narrow axils. It may be separated from *C. capitata* by its non-viscid and separate tips and shorter spores.

CLAVARIA FILICICOLA n. sp.

(Plate VI, figs. 4 and 5, text fig. 1. (H).)

Plantae ramosae, parvae, plerumque 2-4 cm. altae, in forma variae, surgentes e mycelio denso et albo quod se cum fibris truncae Dicksoniae conjungit. Basis plantae aliquantum crassa, abrupte e mycelio surgens, sine radicibus perspicuis, saepe tomentosa a mycelio. Rami, qui duo et magni aut plures et minores esse possunt, sine discrimine oriuntur. Hi in vicem raro se dividunt et plerumque apices ultimos portant. Apices acutissimi sunt parvi et nonnumquam divaricantes sunt. Caro plantae est solida et ubi novella est facile frangi potest sed cum aetate mollior et flexibilior fit. Sapor et odor nullus. Color plantae juvenilis alba, grandioris "Maize Yellow" ad "Ochraceous Buff." Hymenium levis, in similitudenem pulveris aetate mutatem est. Basidia quattuor sterigmata habent. Sporae "Maize Yellow" in massa, perspicue asperae, quae saepe collabuntur, oblongo-ellipsoidae cum mucrone obtuso et obliquo, 5.6–7 × 3.6–3.9 μ. *Hab. in trunca Dicksoniae antarcticae plerumque aut inter bases frondium viventium aut infra eas. Loc. Turton's Pass, Apollo Bay. Mai.*

Plants branched, small, usually 2–4 cm. high, rather variable in form, arising from a dense white mycelium which binds together the fibres of the Dicksonia trunk. Base of plant stout, in relation to size of plant, often woolly from the mycelium, branching very irregularly into two large branches or into many crowded smaller ones which in turn may be very sparingly branched, but generally give rise to the ultimate tips which are very sharply pointed, small, and sometimes divaricating. Flesh solid, brittle in youth, becoming softer and more pliable in age. Taste and odour none. Colour, pure white when young, Maize Yellow to Ochraceous Buff when old.

Hymenium smooth, apparently powdery when old. Basidia with four sterigmata. Spores Maize Yellow in bulk, distinctly rough, often irregular by collapsing, when fresh, oblong elliptic with broad obliquely terminal mucro, 5.6–7 × 3.6–3.9 μ. Habitat—on trunks of *Dicksonia antarctica,* usually immediately below the crown of leaves. Locality—Turton's Pass, Apollo Bay. May.

This species most closely resembles *C. gracilis,* but may be distinguished from it by its stouter and more solitary habit, rough spores, lack of distinct odour, and chiefly by its very characteristic place of growth. *C. gracilis* is found only under pine trees.

CLAVARIA ABIETINA. *Non-Virescent Form.* Coker. Clav. U. S. and Canada, p. 182. Chapel Hill. 1923.

? *C. corrugata* Karst. Nat. Faun. et Flora Fenn., p. 371, 1868.
(Text fig. 1. (G).)

Plants branched 3.7 cm. high and 2–5 cm. broad, growing in large colonies under *Pinus radiata,* arising from a dense white subiculum which mats the fallen needles together. Trunks stout, equal to about one-fifth of the plant in height, irregular and incrassated, deeply channelled in age, branching very irregularly, often palmately three or four times. The ultimate branches generally erect, but may be spreading, tips short, acute, spreading, usually produced in a palmate or cristate fashion, axils acute. Surface of young plants smooth, in older specimens much incrassated. Branches often fusing with one another, sometimes uniting the upper parts of separate plants by this process.

Flesh of densely interwoven hyphae, tough, opaque, often hollow or loosely stuffed in the centres of older branches, soft and rather flexible. Colour—Cream Buff, Chamois, Pinkish Buff. Tips whitish. Not staining when bruised. Smell slight, like radish, taste mild, indistinct.

Hymenium smooth in younger parts of plant, often double in older parts. Basidia with four sterigmata. Spores yellowish, oblong elliptical, often broader at the distal end, finely and evenly roughened, 6.2–8.1 × 3.1–4.3 μ. Locality—Sherbrooke, under *Pinus radiata.* May.

This plant may be distinguished from *C. gracilis,* which favours the same habitat, by its stouter habit and deeper colour. Cooke records *C. abietina* for Victoria giving the spore measurements as 7–10 × 4–6 μ and the habitat as "Fir woods." If the spore measurement is correct it is most likely that Cooke had *C. apiculata* (spores 3.7–4.6 × 7.4–9.2 μ) as the spores of the various forms of *C. abietina* are much smaller than this. If, however, the spore measurement is incorrect and Cooke really had a form of *C. abietina* it is possible that he had the *flaccida* form which Cleland has recorded (as *C. flaccida*) from Callitris woods in South Australia. It is most likely that Cooke's specimen was also collected in *Callitris* woods, as it must necessarily have been collected prior to 1892 when there were no extensive plantations of introduced Conifers in the State. There is also some evidence to show that in the past the various species of *Callitris* were known as "Firs."

In view of the constant association of *C. gracilis* and *C. abietina* (non-virescent form) with species of *Pinus,* it is most probable that they are not native and have been introduced with these trees; as, although many of the Victorian pine plantations abut on native forest and are growing under apparently similar conditions, neither *C. gracilis* nor *C. abietina* (non-virescent form) are found growing away from the pines in the native forest.

GENUS **Physalacria.** (Fr. ex. Schw.) Pk.

PHYSALACRIA INFLATA (Fr. ex. Schw.) Pk. Bull. Torrey Bot. Club, 9: 2: 1882.

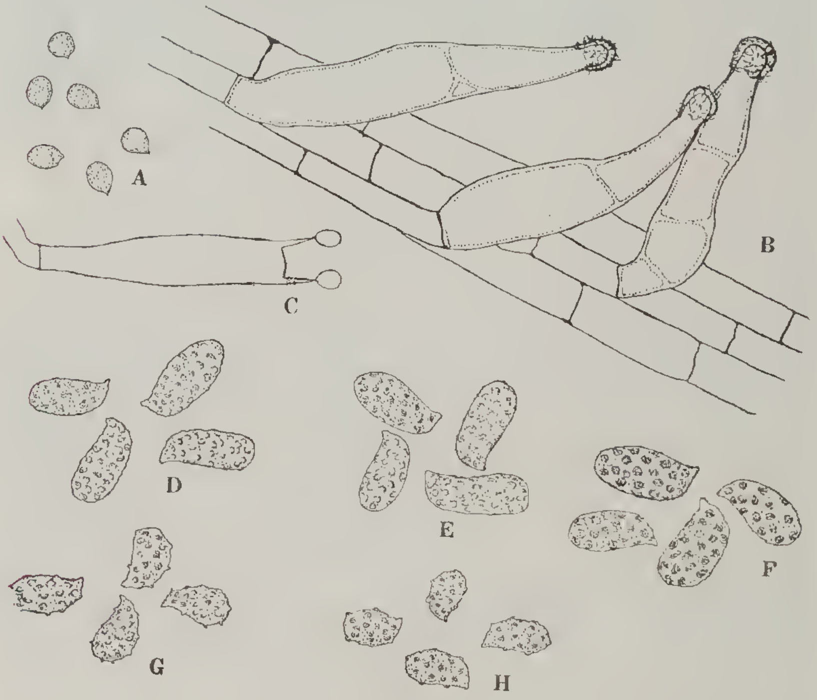
(Plate VII, figs. 2 and 3, text fig. 1 (A), (B), (C).)

Plants small, usually 0.4–1 cm. high, occasionally 1.3 cm., at maturity, consisting of an irregularly-globose, swollen, thin-walled bladder, 0.3–0.5 cm. diameter, supported on a firm slender stalk 0.1–0.15 cm. diameter, and 0.3–0.6 cm. long. In some cases the irregularities of the head are confined to the undersurface and resemble gills as they radiate from the stalk. Frequently, the likeness to a small, white-spored Agaric is increased by the collapse of the upper part of the bladder over the lower. When young, the heads are almost uniformly globose. The plants most often occur in extensive colonies in groups of two or three, occasionally singly, or in dense clusters with the heads closely appressed and obscuring the stalks. Colour, when young, pure white; in age, yellowish, or brownish-white. Texture, rather membranous, resisting tearing.

Under the lens, the head and stalk appear to be covered in short, glistening bristles, owing to the presence of strongly projecting cystidia. These are irregularly cylindrical structures bearing a knob-like process at the apex. This process is relatively thick-walled and on the outside is covered by a mucilaginous substance. The hymenium is sharply delimited, occurring only on the head, covering it entirely. Basidia inconspicuous among the cystidia, two-spored.

Spores smooth, white, sub-globose or elliptical, 2–3 × 3–4 μ. Mucro very inconspicuous. Habitat—on dead wood in very wet gullies. Localities: Sherbrooke, November, February, March; Ferny Glen, Apollo Bay, May. Not previously recorded for Australia.

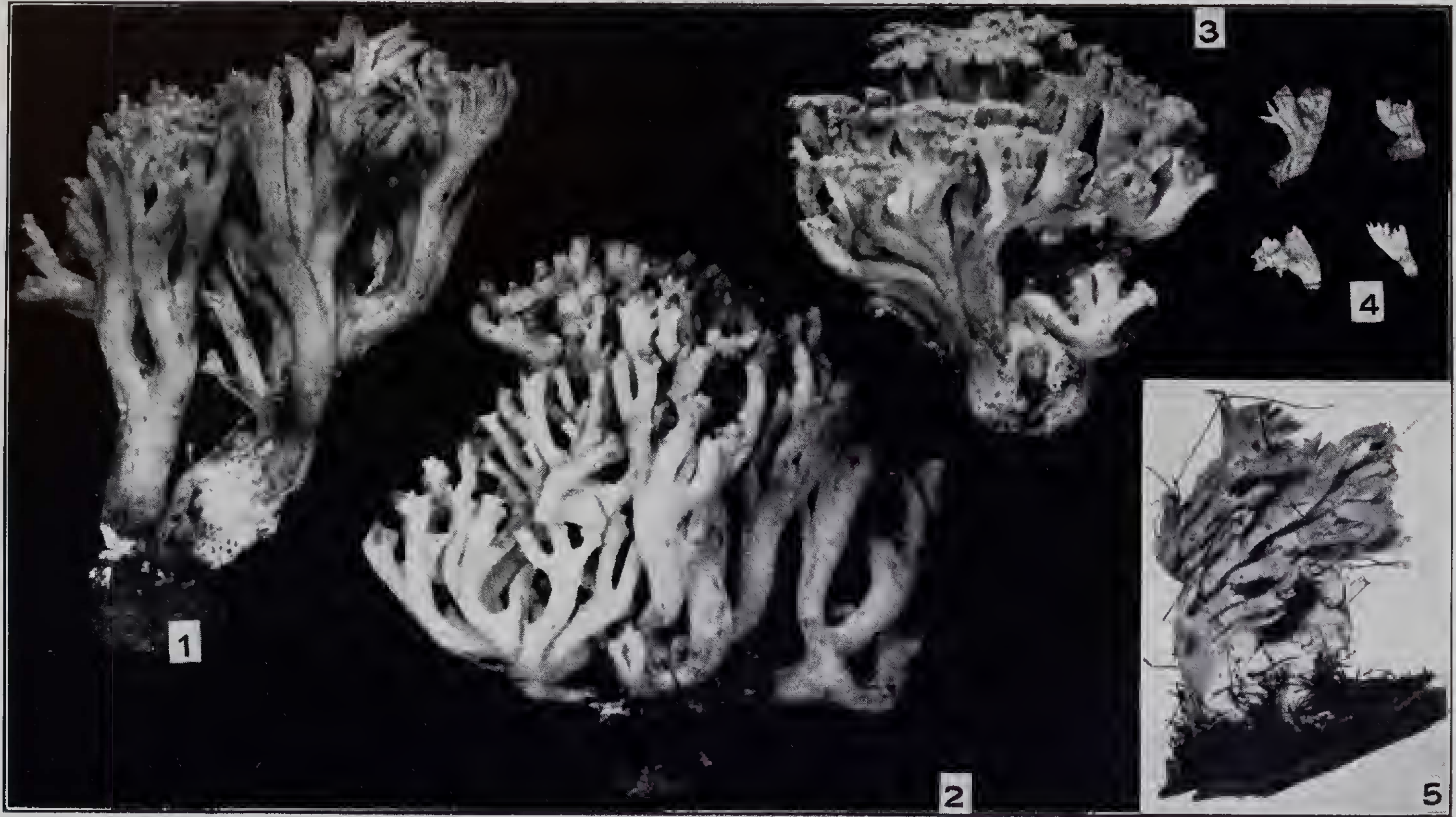
This plant has a very complicated history. De Schweinitz collected it and, giving it the manuscript name *Leotia inflata*, sent it to Fries, who, however, published it as *Mitrula inflata* (Elenchus Fungorum, Vol. 1, pp. 234 and 235), referring to de Schweinitz's name. Later, in Epicrisis (p. 584), he repeated the description with the name *Mitrula inflata albida*. In 1878, Cooke (Mycographica, p. 204) for no apparent reason, changed the name to *Spathularia inflata*. In 1882, Peck proved that the



Text Figure I.

A. Spores of *Physalacria inflata;* B. Cystidia from stem of *P. inflata;* C. Basidium of *P. inflata.*

Spores:—D. *C. flava.* E. *C. flava var. aurea.* F. *C. ochraceo-salmonicolor.* G. *C. abietina. Non-virescent form of pines.* H. *C. filicicola.*
Magnification:—A, D, E, F, G, H, 1,125. B, C, 500.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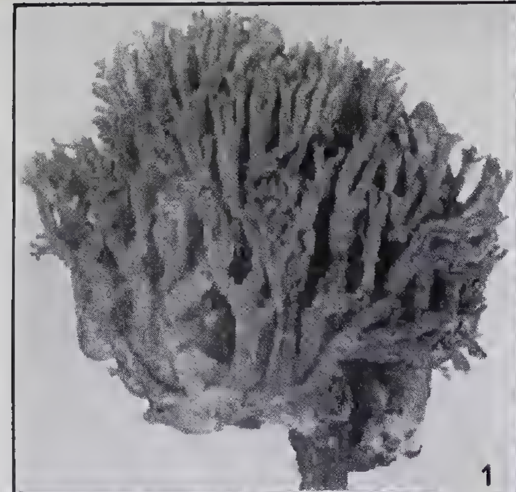

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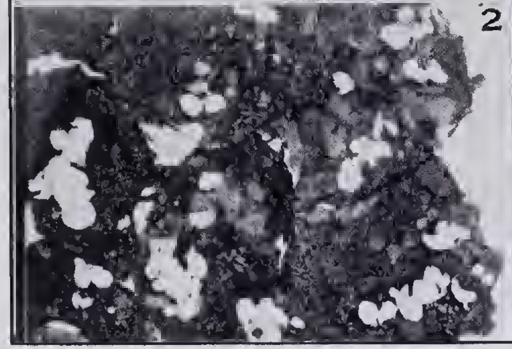

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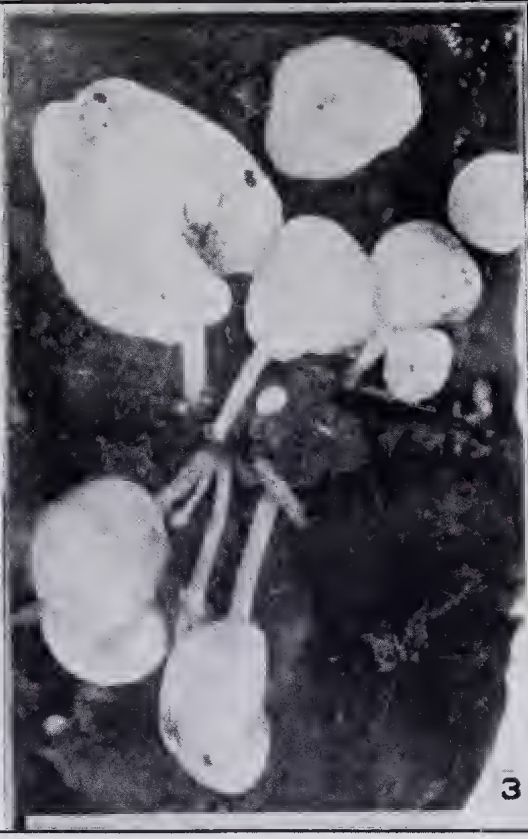

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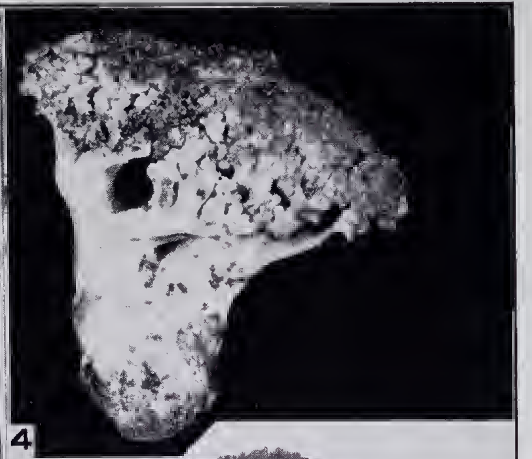

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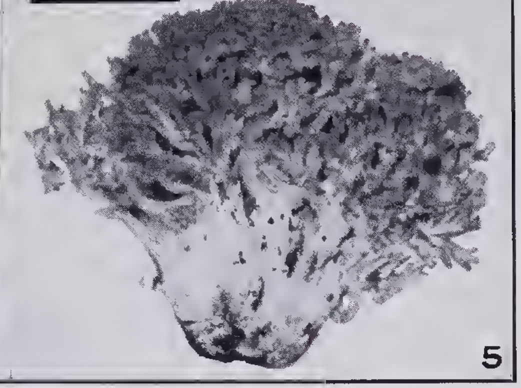

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plant was, in reality, a Basidiomycete, and suggested that the previous authors had mistaken the large cystidia for empty asci. As he found that the hymenium completely covered the head he placed the plant in the Clavariaceae, establishing the name *Physalacria.*

In 1923, Krieger (3) removed the genus to a primitive position in the Agaricaceae, renaming it *Eoagaricus.* This name, however, is not valid, as the Rules of Botanical Nomenclature do not permit such a change. He stated that the hymenium was confined to the under surface of the head and that the upper and under surfaces showed differences in texture and colour. He interpreted the irregularities which are frequently seen on the under surface of the older plants as primitive gills. In the Victorian plants the hymenium covers the entire head and there are no apparent differences in texture or colour between the upper and lower surfaces. There can be no doubt that our plants are correctly identified as they agree exactly with Peck's description. Thus there is no evidence in support of Krieger's statements. It is possible that the plants on which he based his work were abnormal. Therefore it seems that *Physalacria* should be retained in the Clavariaceae.

References.

FAWCETT, S. G. M.—*Proc. Roy. Soc. Vic.*, vol. LI, part I, pp. 1-20, 1938.

FAWCETT, S. G. M.—*Ibid.*, vol. LI, part II, pp. 265-280, 1939.

KRIEGER, L. C.—*Bull. Maryland Acad. Sci.*, 3: 7, 1923.

Explanation of Plates.

Unless otherwise stated, all photographs are natural size.

PLATE VI.

1. *Clavaria flava.* Rugose plant.
2. *C. flava.* Smooth plant.
3. *C. ochraceo-salmonicolor.*
4. *C. filicicola.*
5. *C. filicicola.* (× 3).

PLATE VII.

1. *C. flava* var *aurea.*
2. *Physalacria inflata.*
3. *Physalacria inflata.* (× 9). Note cystidia on the stalks and heads.
4. *C. ochraceo-salmonicolor.*
5. *C. flava.*